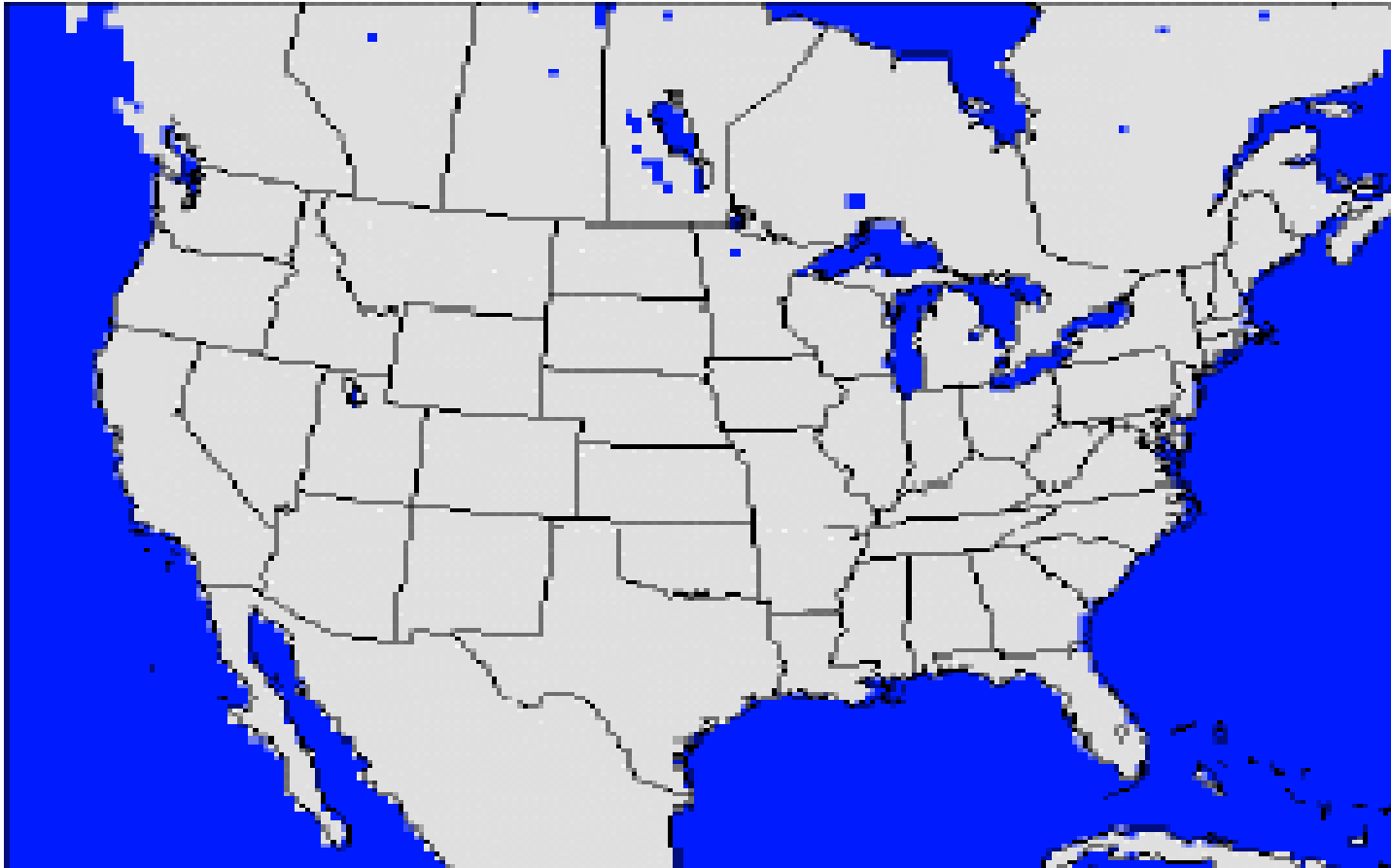




# Cem Data Analysis And Use

Mark Janssen – Midwest RPO

# Emissions Modeling Domain





# LADCO Inventory

- August 1999, January 2000
- Future CEM for annual 2002 run when data available.
- Anthropogenic emissions based on USEPA's 1999 National Emissions Inventory Version 2

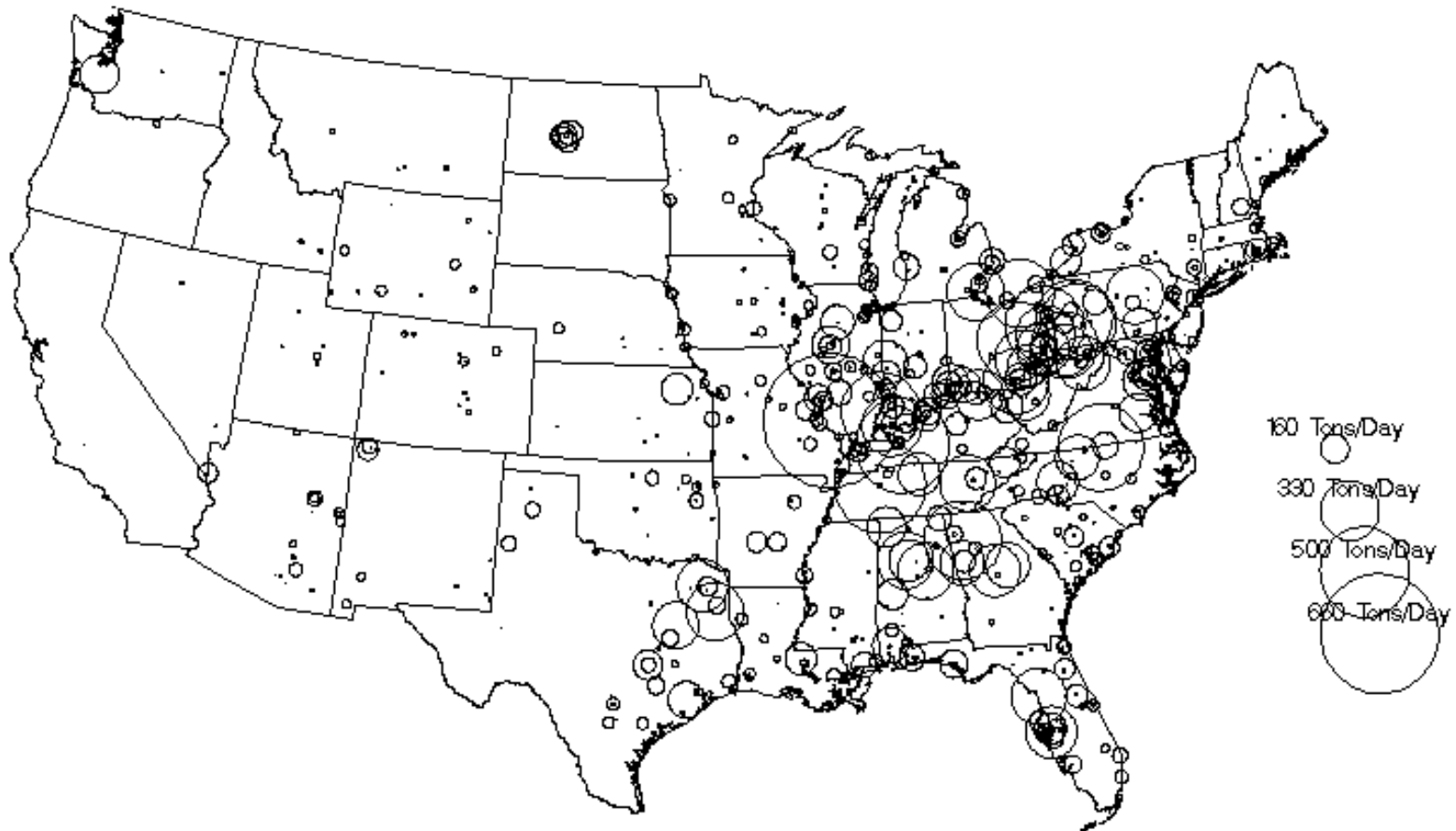
# Version 2 NEI Issues

## ■ Point Sources

- State ID's replace ORIS ID's
- Temporal still weak in NEI, Flat
- Few unreasonably high values in Florida, Michigan, and Colorado – Fixed/Removed
- EGU inventory 6-7000 Tons/Day NOX lower than V2 Draft (removed double counting)

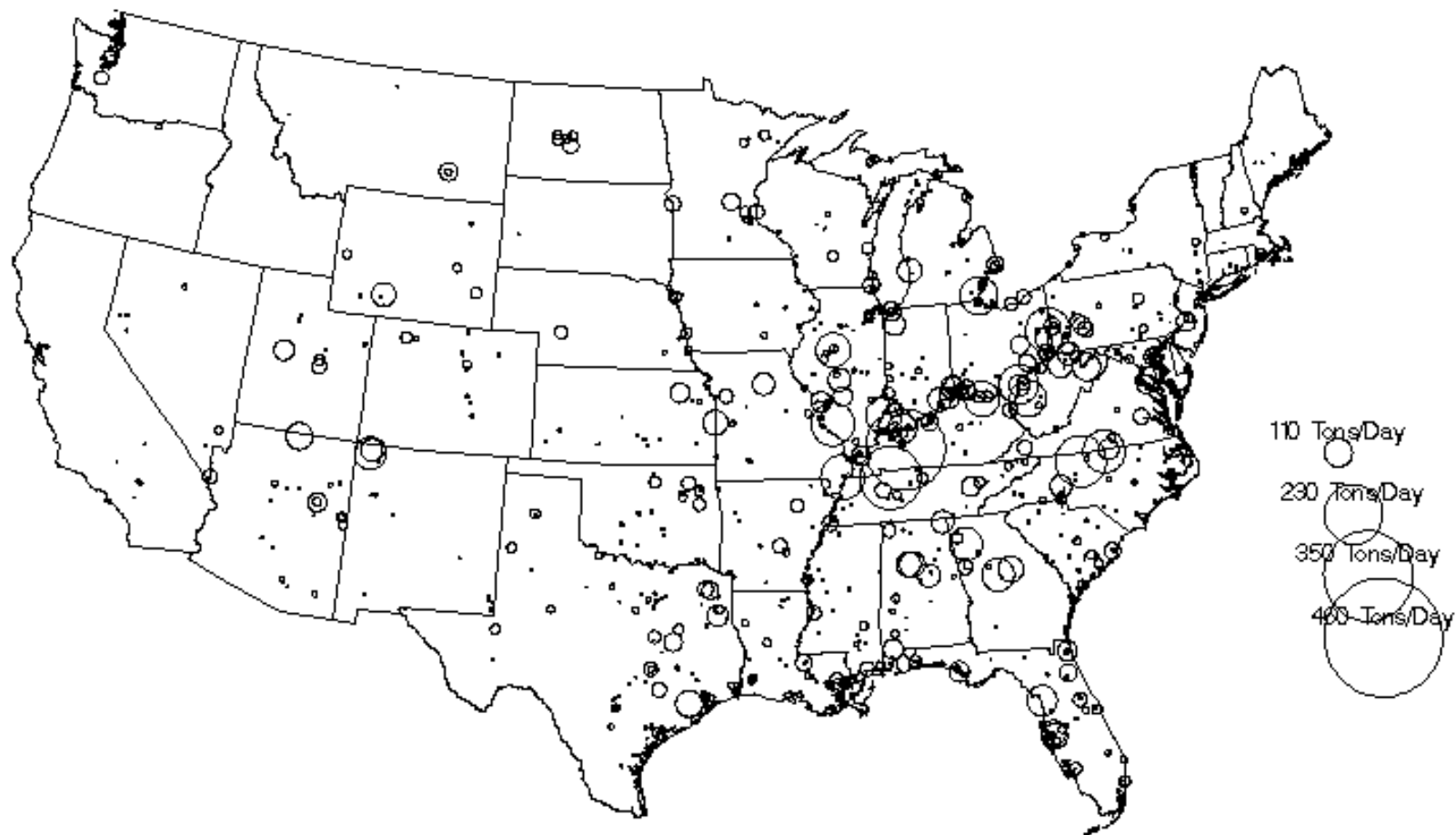
# Circle Plot of SO<sub>2</sub> Sources

CASE: BaseE



# Circle Plot of NOX Sources

CASE: BaseE

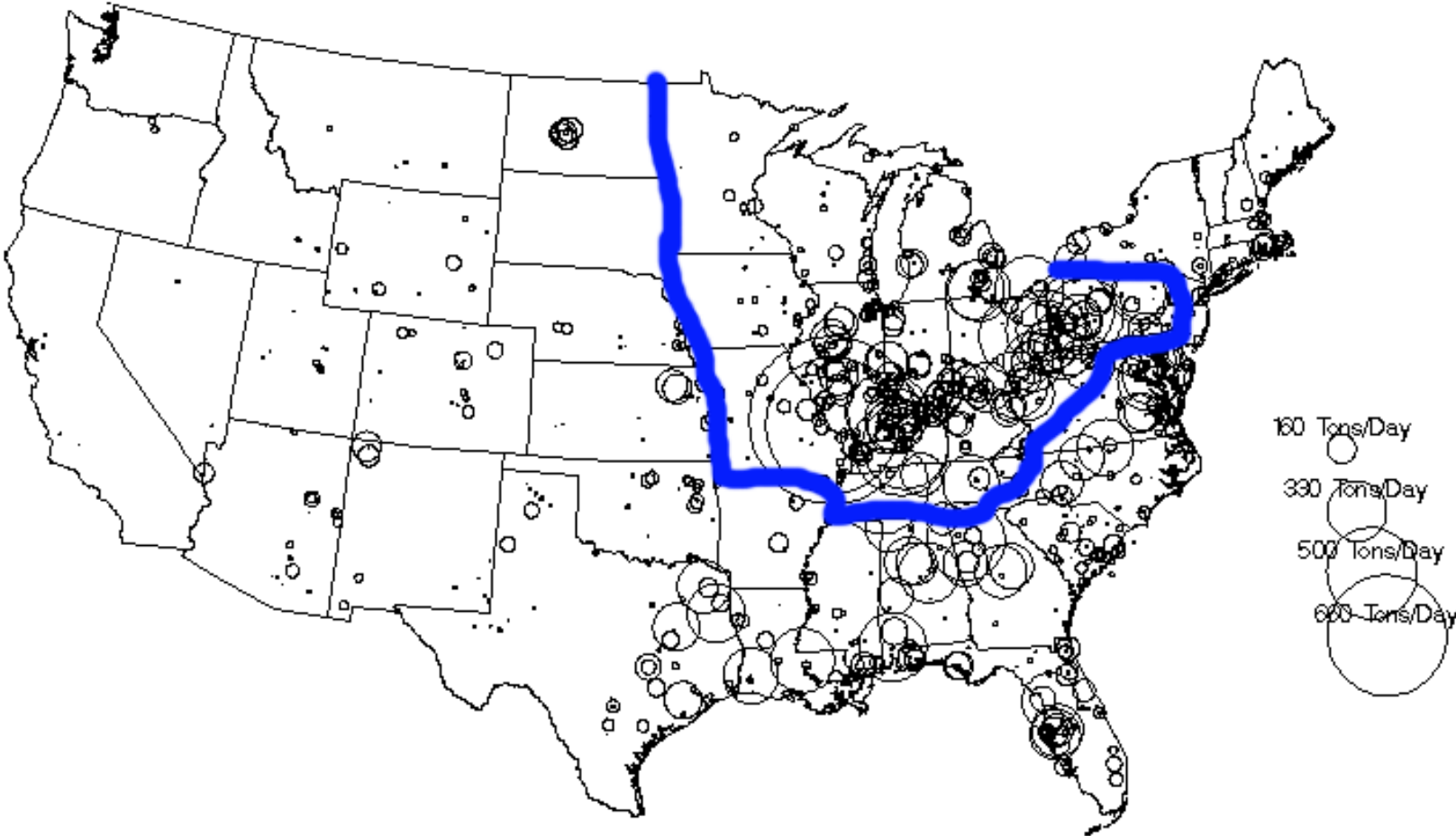


# Using the Raw CEM Data

- Prepare NIF2.0 model-ready point source emission files based on 1998 - 2000 CEM data
  - Need to match ID's with 1999 NEI at LADCO
    - NEI base on State ID's, CEM based on ORIS ID's
      - Matching good for midwest, Poor elsewhere.
  - Huge 14Gig per year in NIF.

# Circle Plot of SO2 Sources

CASE: 99nei\_test



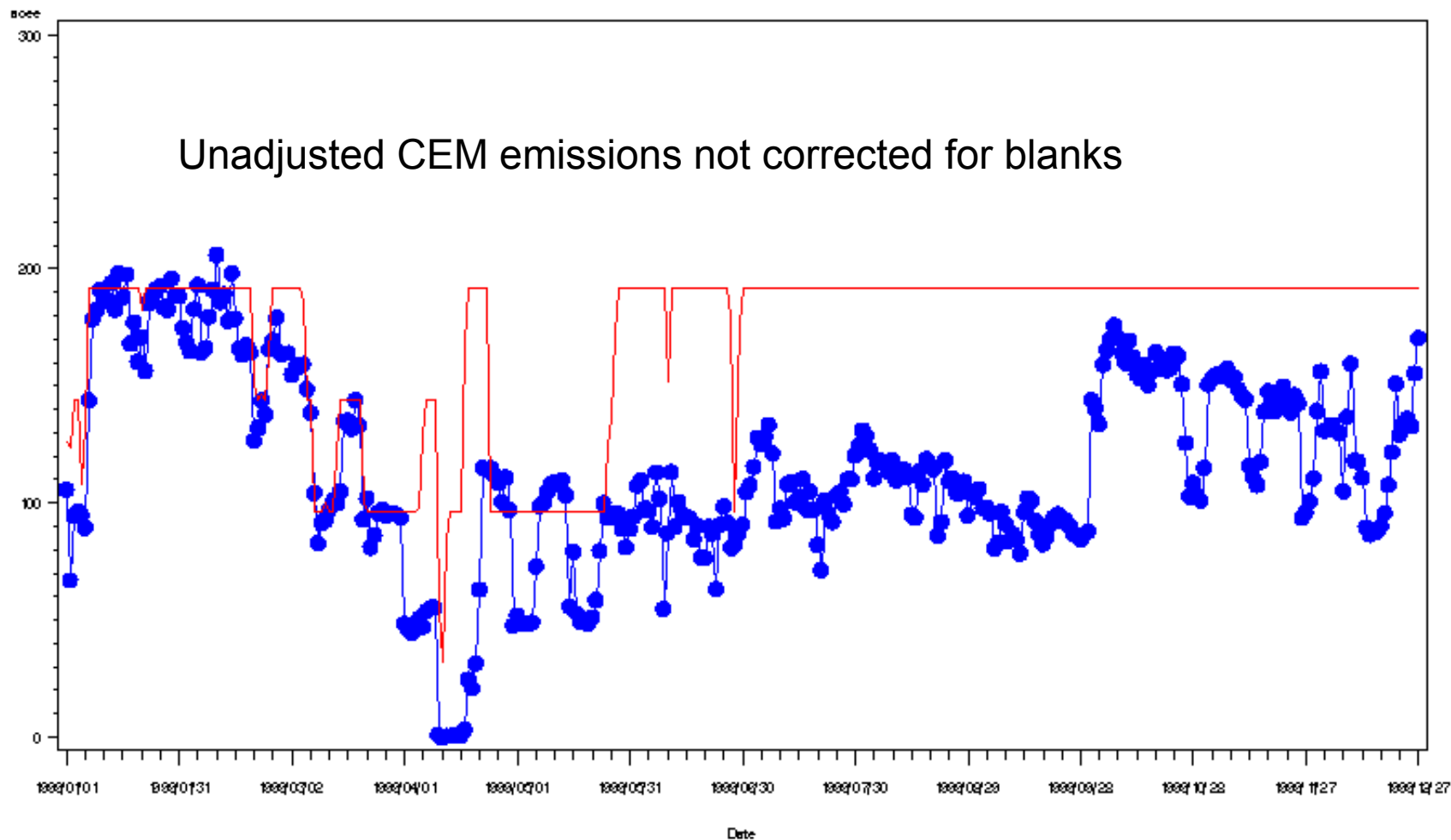
# Report of CEM with no match in NEI for August 1999

- IL 5.6 TPD
- IN .6 TPD
- MI 13 TPD Eckert & Moores Park Station?
- OH 1.5 TPD
- WI 1.4 TPD
- That's real good!
- Delaware/Nebraska lost over 50% of CEM Mass.

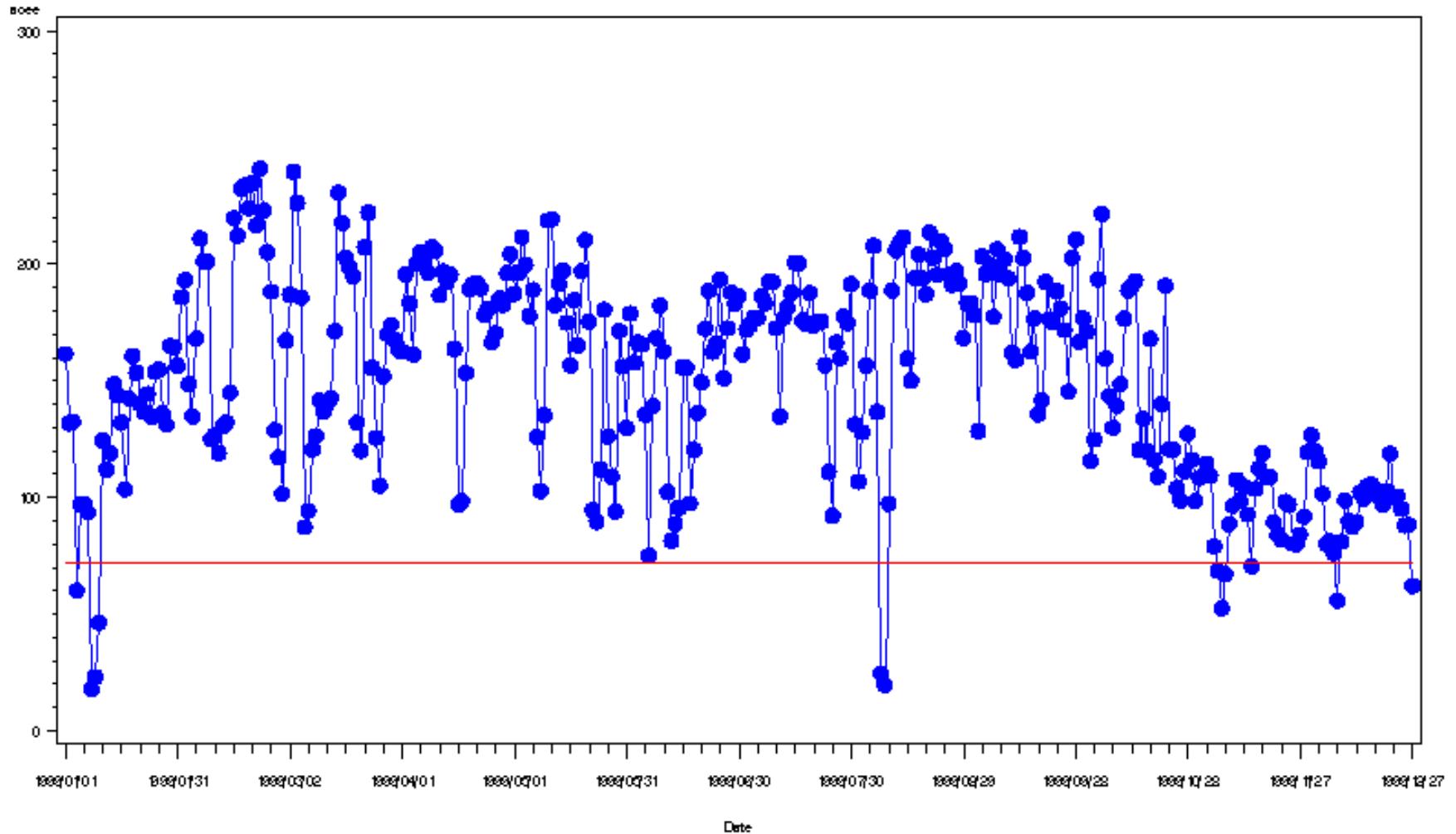
# Dealing with Blanks

- What to do about Missing or Zero Data
  - Blank emission records common.
  - New Tools replace blank records with zero emissions where there are pre-existing CEM records for that month
  - Lessens overall Point NOX Tons/Day variability
    - BaseB(24,500-37,800)~32000 Midpoint NOX TPD
    - BaseD(21,600-32,700)~25000 Midpoint NOX TPD

# Daily Emissions for MONROE ORIS ID : 1733



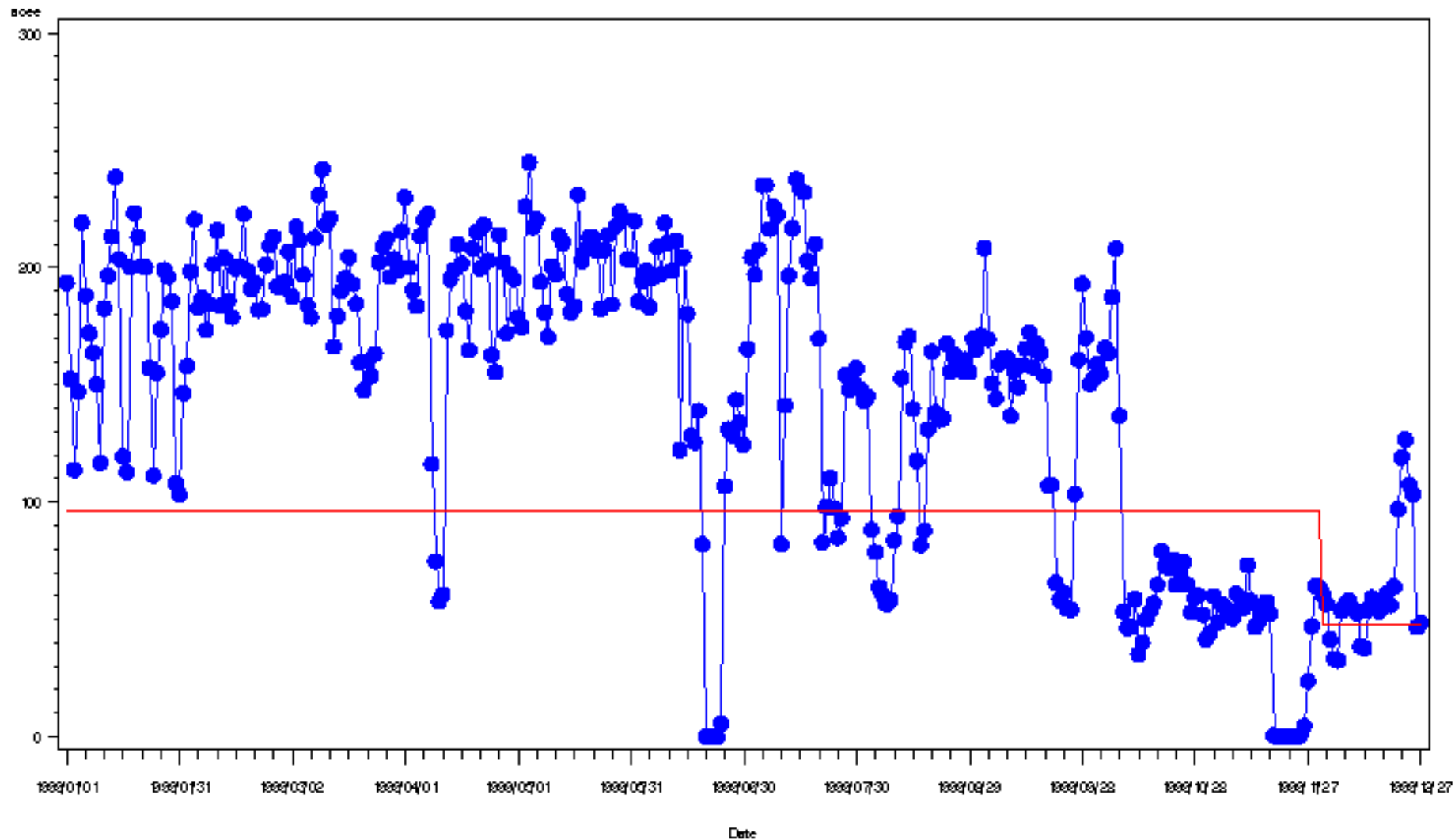
# Daily Emissions for facility ILLINOISPOWERCO.—BALD ID : 157851AAA



ORIS ID = 157851AAA

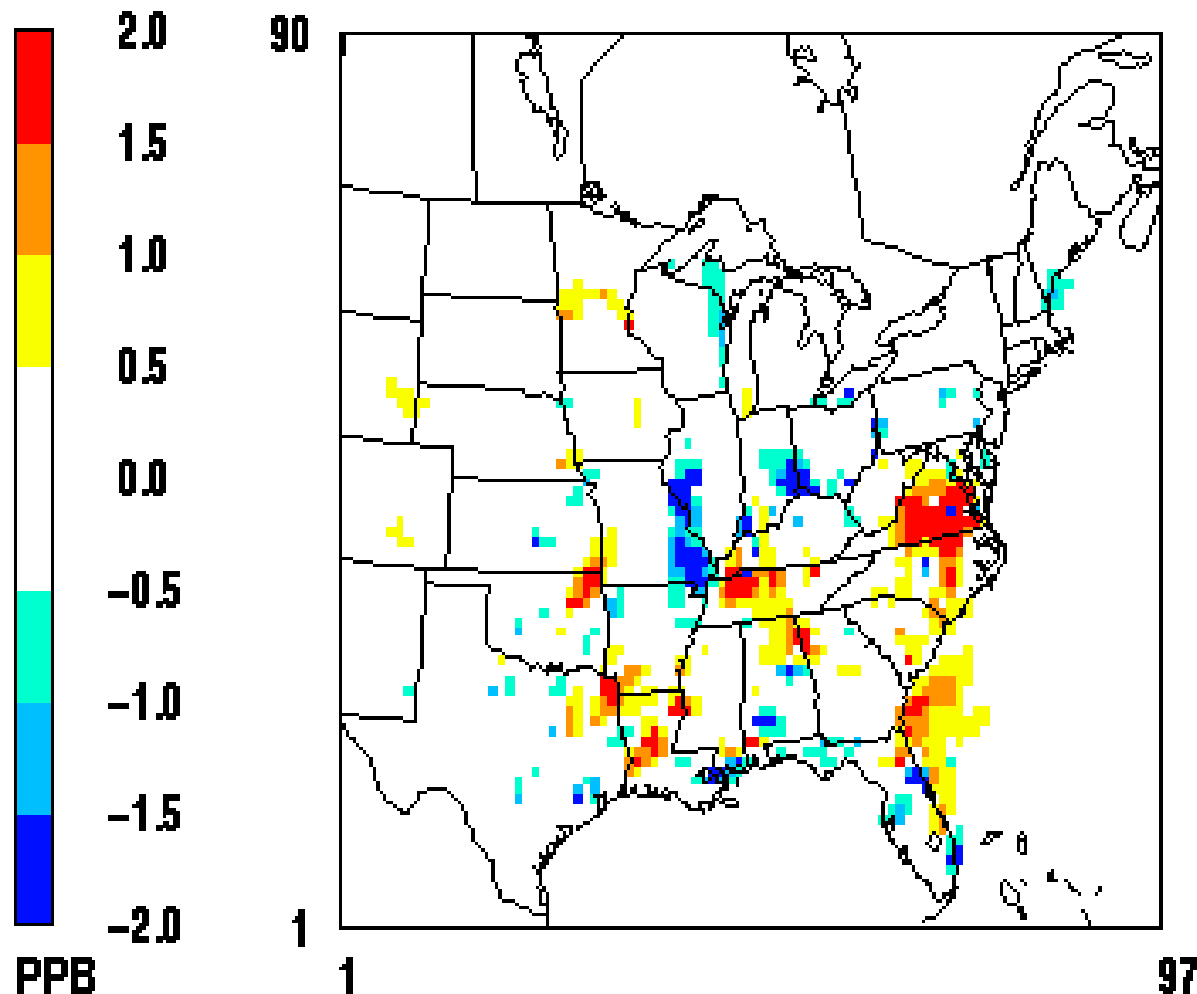
●—● Emissions Tons/Day      — # obs

# Daily Emissions for facility GAVINPOWERPLANT ID : 0627010056



# rawcem2 - baseC

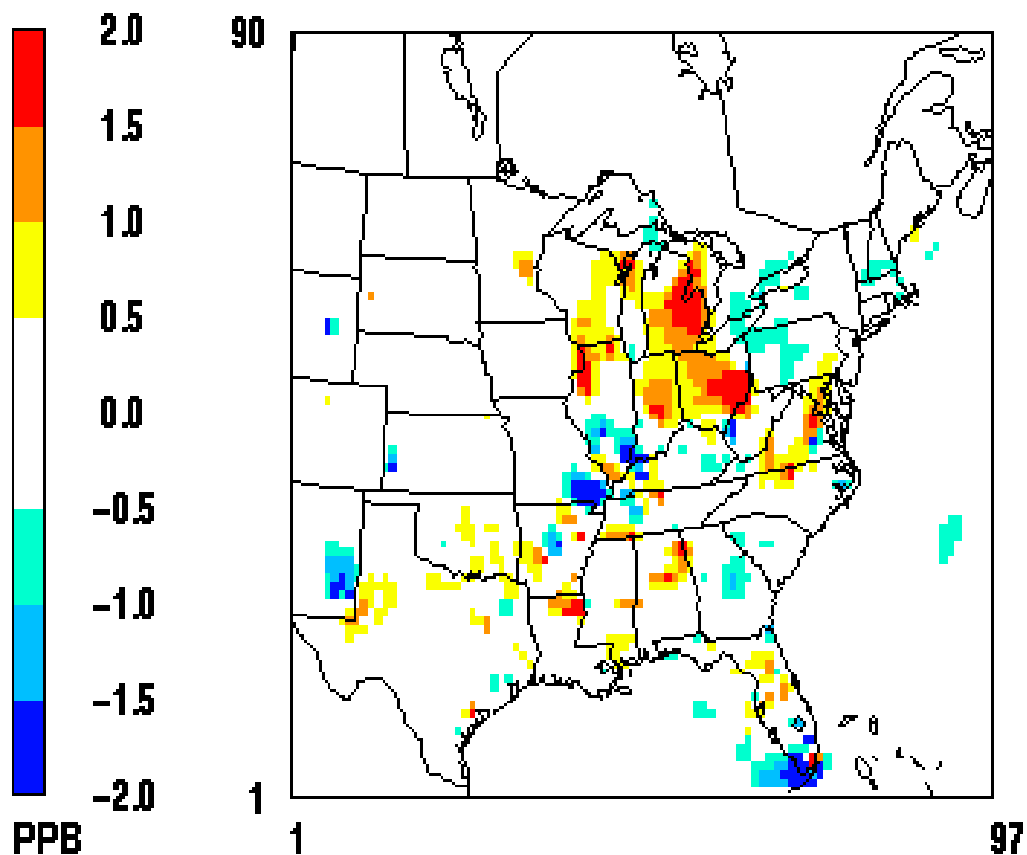
Daily Maximum Ozone Difference  
36km grid



August 11, 1999 0:00:00  
Min= -7.6 at (73,42), Max= 6.2 at (73,40)

# rawcem2 – baseC

Daily Maximum Ozone Difference  
36km grid

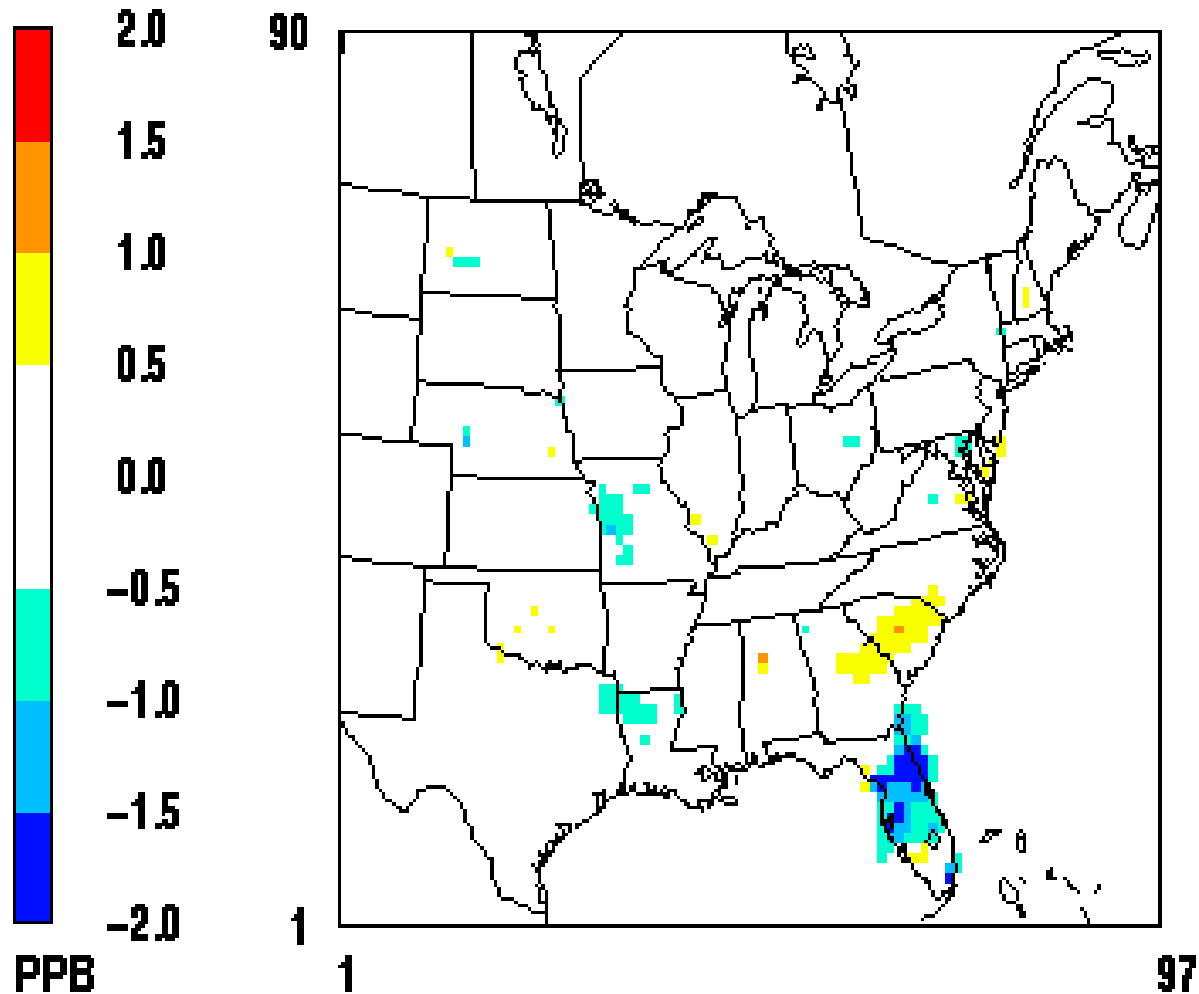


September 1, 1999 0:00:00

Min= -4.9 at (43,36), Max= 21.3 at (73,4)

# rawcem2 - baseC

Daily Maximum Ozone Difference  
36km grid

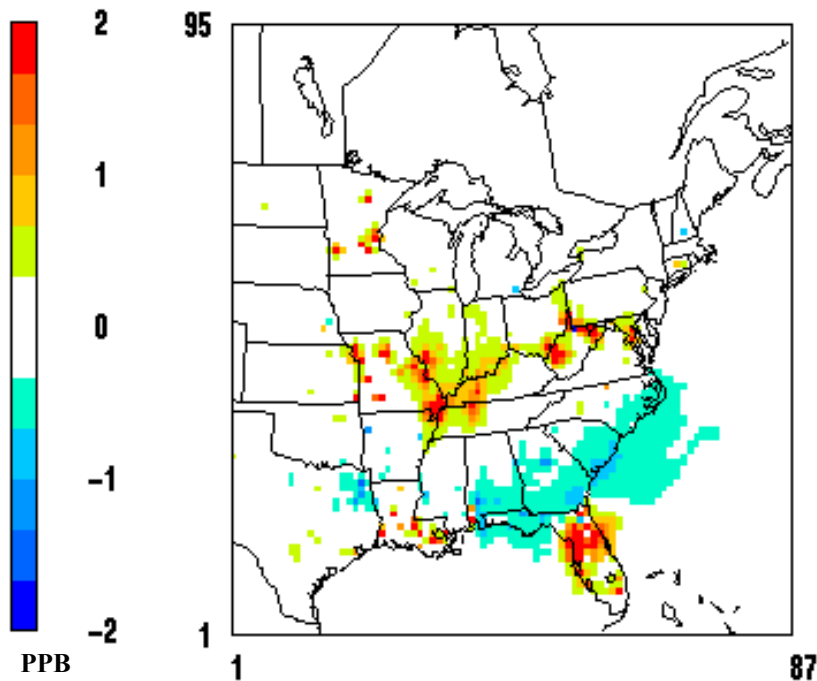


January 11, 2000 0:00:00  
Min= -3.3 at (67,17), Max= 1.2 at (51,27)

# CEM Sensitivity (aug 99)

## O3 Episode AVG

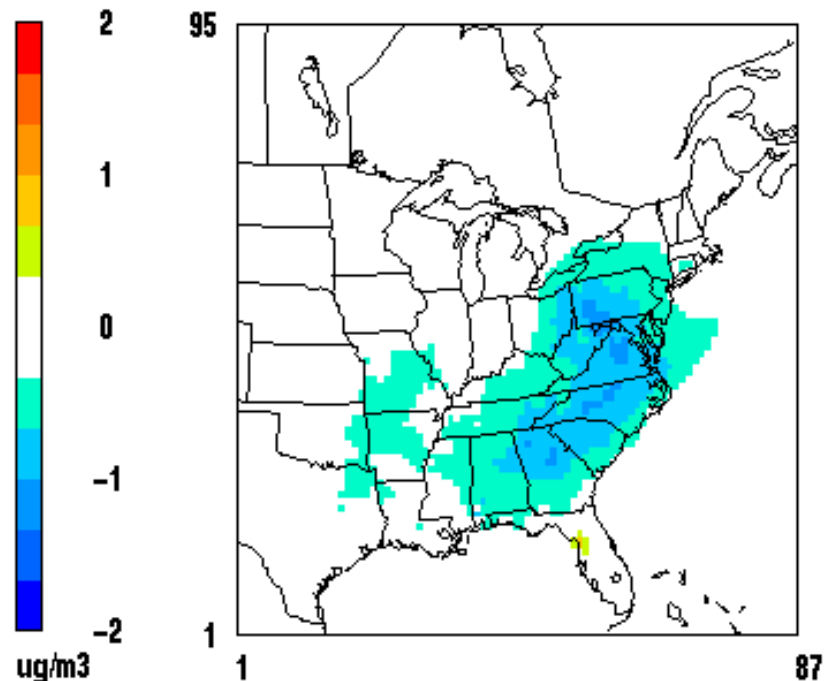
baseA - cem  
eus 36 km - 1999



August 3, 1999 0:00:00  
Min= -2 at (54,48), Max= 20 at (33,36)

## PSO4 Episode AVG

baseA - cem  
eus 36 km - 1999



August 3, 1999 0:00:00  
Min= -1 at (50,27), Max= 1 at (54,15)

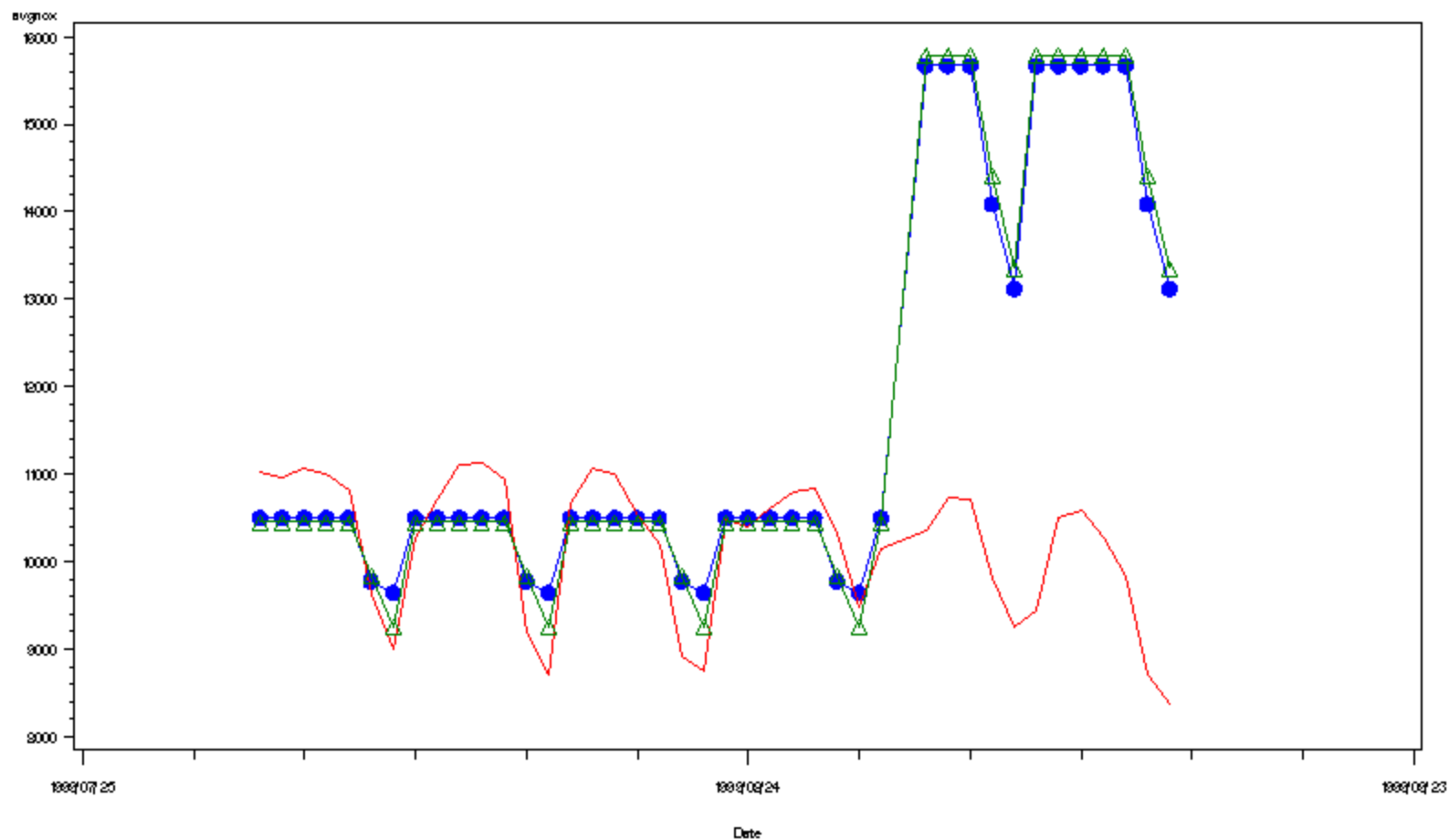
# Why build Temporal Profiles From CEM?

- CEM data is great for base year model validation. Answers the question: Can this photochemical/emissions modeling system duplicate reality
- CEM **Can Not** be used in future year modeling. If facility XYZ was closed on July 16<sup>th</sup> 2002 will it be closed on July 16<sup>th</sup> 2018?
- So we must create conceptual and computation models to mimic the behavior of facilities so we can build appropriate future year inventories.

# EH Pechan Temporal Effects

- Based on 1998 - 2000 CEM data, create day-of-week and hourly profiles
- Put Pechan profiles into models as NIF2.0 Point “EP” record types.
- Ran with Version 2 of NEI99
- Raw Pechan data has Hourly Profiles by day of week and season
  - LADCO used Wednesday value for all days by season
- Raw Pechan data has day of week by season.
  - Used Raw Pechan Data

# Daily Emissions for Point sources NOX STID= midwest

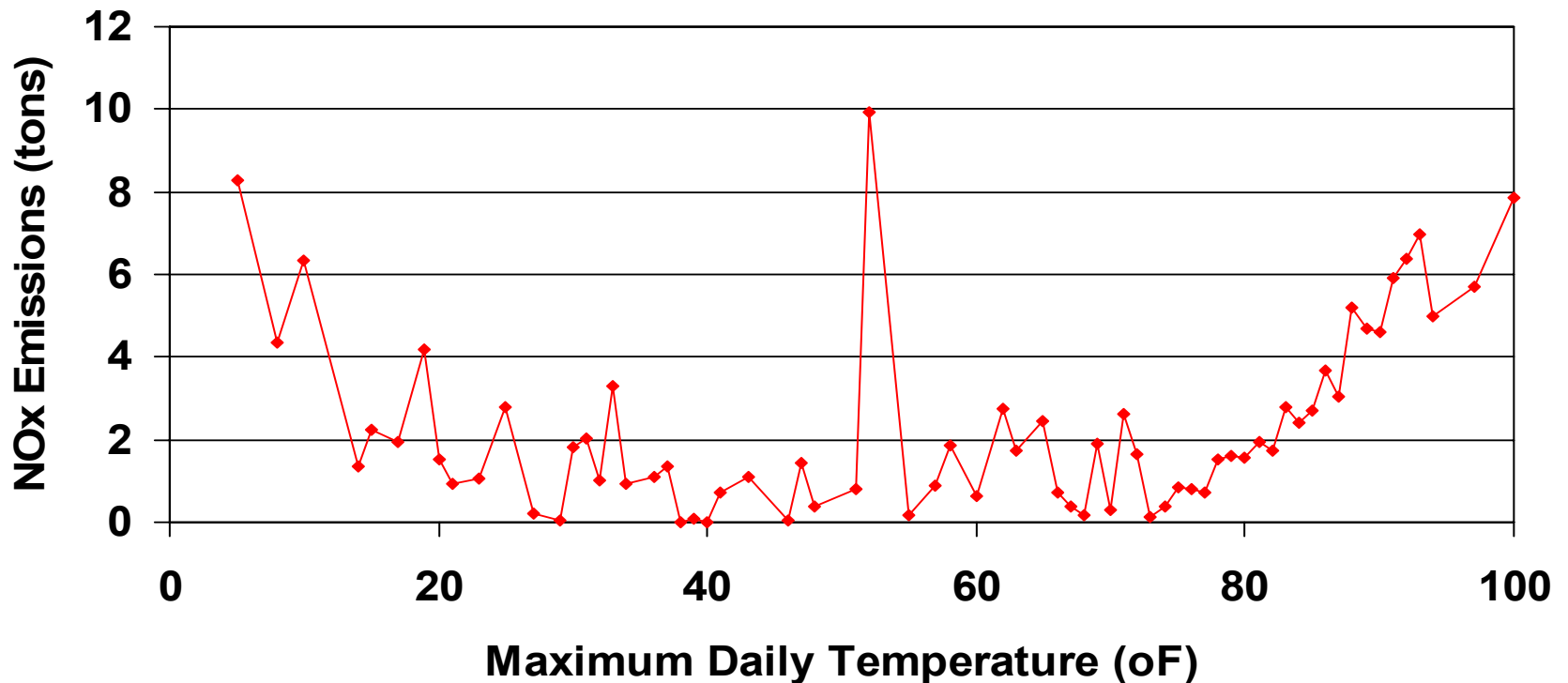




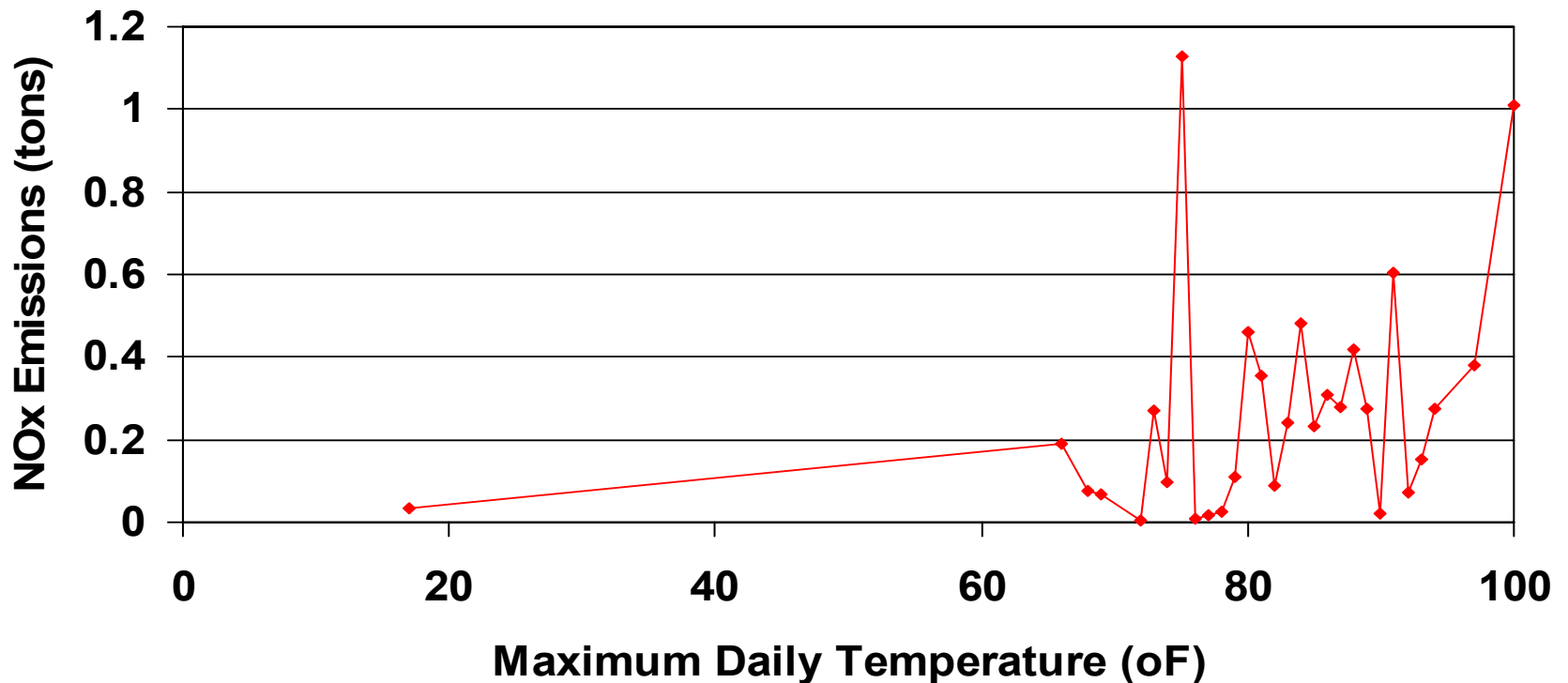
# Foundations of Future Temporal Models

- Using 1998-2002 data to identify variations in load/emissions to classify as base load, peaking unit , or somewhere in between.
- Establish month of year and hour of day profiles to show variability in emissions base on CEM
- Apply temperature corrections on top of these to reflect daily min/max.
- Identify units that are likely to change from peaking to base load based on growth assumptions. Change their temporal attributes to match.

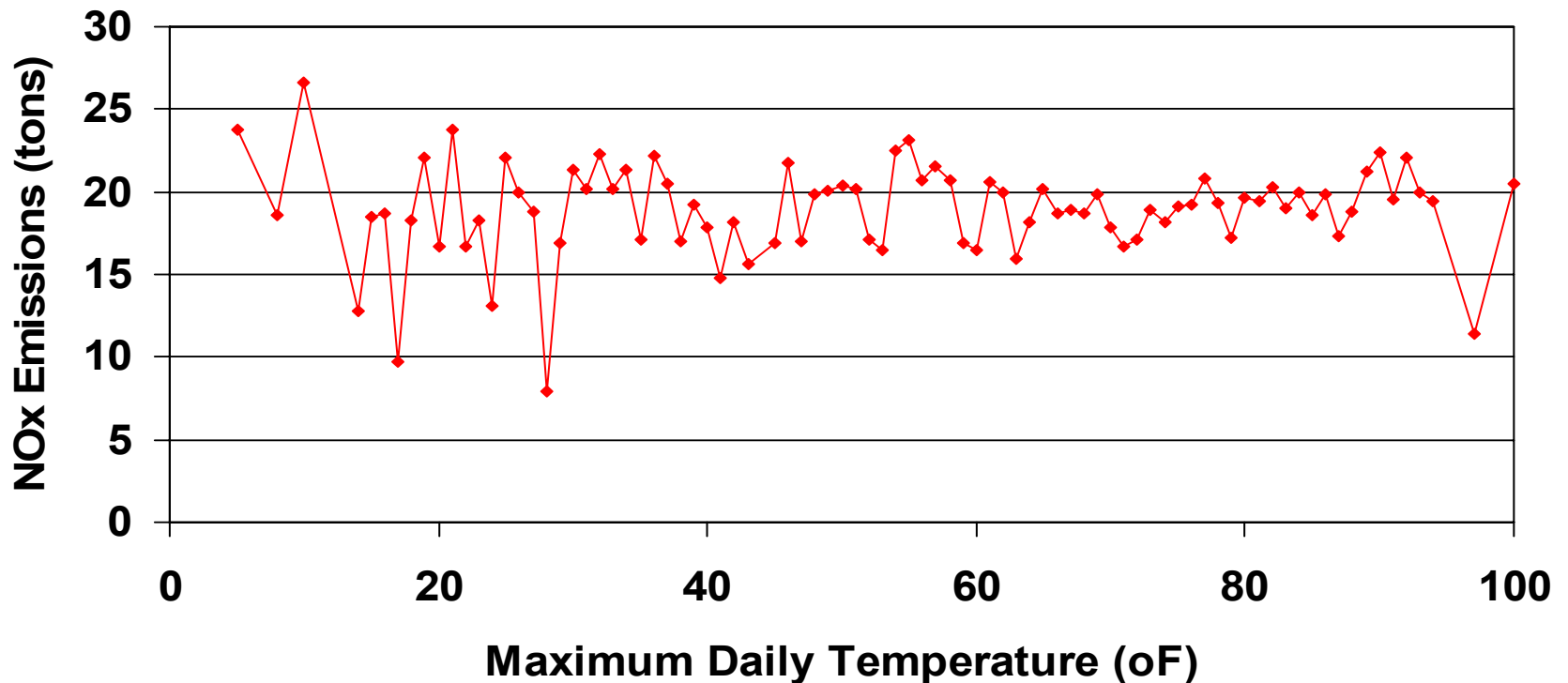
# NOx as a Function of Temperature—Blr A



# NOx as a Function of Temperature—Blr B



# NOx as a Function of Temperature—Blr F





# MWRPO Future directions

- Reanalyze 1998 – 2002 when it becomes available from EPA in RPO format.
- Build profile generation tools we run ourselves to allow iterative process
- Do new modeling (Base F?)
- Work with MWRPO stakeholders to see how our predictions work?